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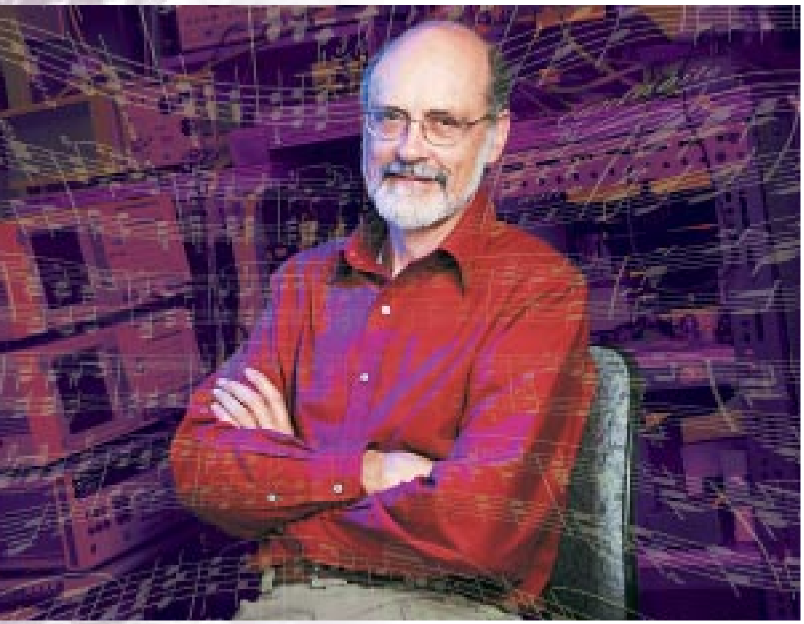
"Superconducting" a Career Crescendo

Physicist—and pianist—Walter Hardy's scientific career has led to major discoveries in low-temperature physics. He recently won the prestigious Fritz London award for his pioneering research in hydrogen and high-temperature superconductors.



For over three decades Physics Professor Walter Hardy has taught, collaborated with and inspired students and colleagues alike—and helped UBC gain an international reputation in condensed matter physics.

In August 2002, Professor Walter Hardy will be presented with the Fritz London Memorial Award at the 23rd International Conference on Low Temperature Physics in Hiroshima, Japan. He is in good company. Eight previous recipients have gone on to win Nobel prizes. Despite several other major awards and 233 journal publications and conference proceedings to his credit, Hardy is modest about his achievements. "I've worked in a number of different areas so this award only makes sense to me if you add up the bits."

Hardy says there was very little connection between his early work in solid hydrogen (H_2) and his current work on superconductivity. But during our discussion parallels soon surfaced—such as growing crystals and measuring their properties with microwaves. "The study of these materials with either light or microwaves depends on the angle of the beam and the direction of the crystal," he says. "The only way to get accurate measurements is with single crystals, and my first work growing crystals was with H_2." Hardy also developed a technique of measuring microwave absorption in H_2 that allowed his group to determine the interaction between a single pair of molecules with a thousand-fold increase in accuracy.

In the '80s, Hardy's focus shifted to the study of atomic hydrogen (H), where the molecules of H_2 have been split up. The recombination of H to H_2 is highly explosive, which makes it difficult to work with and almost impossible to harness. His group managed to keep volatile atomic hydrogen separated by putting it into a strong magnetic field and polarizing the electrons so their spins are all parallel. This work led to the development of a new type of hydrogen maser (microwave amplification by stimulated emission of radiation) and another major program of research.

When high-temperature superconductors were cont'd on p. 3

Inside

Botany
Biotechnology Lab
Chemistry
Computer Science
Earth & Ocean Sciences
Mathematics
Microbiology & Immunology
Physics & Astronomy
Statistics
Zoology

ICORD Reaps $13 million for Spinal Cord Research

SINCE 1995, A VIRtual research collective from UBC's faculties of Science, Medicine, Education and Applied Science has been working to find therapies and cures for brain and spinal cord injuries (SCI). With CFI infrastructure funding of $13 million, researchers will finally be under one roof. The International Collaboration On Repair Discoveries (ICORD centre)—to be built at Vancouver General Hospital—will be the only facility in Canada and the second in the world equipped to conduct interdisciplinary neurotrauma research.

"We anticipate that this will become one of the world's premiere spinal cord injury centres," says John Steeves, ICORD's principal investigator and director of the CORD research group at UBC since 1995. The 7,000 sq. ft. facility will eventually be shared by 300 Vancouver-based researchers and graduate students, as well as visiting international scientists. The Rick Hansen Institute and Vancouver General Hospital are partners in the centre.

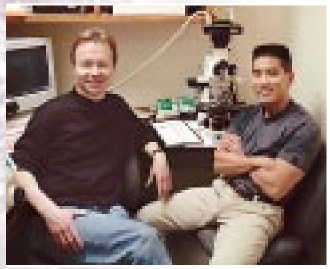


Photo: Cheryl Niamath / UBC

"We have a unique collaboration of basic scientists, clinicians, and rehabilitation scientists," says Wolfram Tetzlaff, joint professor in Zoology and Neurosurgery and Rick Hansen Man in Motion Chair in Spinal Cord Research. He notes the importance of having clinicians trained in basic research to better understand how it can be transferred to the clinical setting. Tetzlaff and colleague Dr. Brian Kwon—orthopaedic surgeon and zoology PhD student—have recently published breakthrough research that gives new hope to patients with chronic spinal cord injuries.

In chronic SCI, nerve cells shrivel and no longer function. "It was believed that they were dead, but the good news is they are not," says Tetzlaff. "If treated at the nerve cell level, they can be brought back to full size and regrow their fine nerve processes." The next step is to try to direct the regrowing nerve fibres into "bridges" across the injury site and down into the spinal cord, and this will involve incorporating regeneration strategies that have been developed by other labs here at ICORD as well as around the world for the acute and sub-acute phases of SCI. "There will be no single therapy for spinal cord injury," says Tetzlaff. "That is why a collaborative approach is so important." www.icord.ubc.ca

New Integrated Biodiversity Laboratory

THE ANNOUNCEMENT OF $16.5 MILLION in funding from The Canadian Foundation for Innovation (CFI) for an Integrated Biodiversity Laboratory (IBL) was joyous news for UBC's Centre for Biodiversity Research. It means they will finally get out of the "huts" that have been home to UBC zoologists and botanists for more than 30 years. More importantly, it puts a spotlight on UBC's world-class biodiversity researchers and the global significance of their work. (Centre Director Anthony Sinclair was elected Fellow of the Royal Society of London in May.)

CENTRE FOR BIODIVERSITY RESEARCH

Illustration: CBR

The new facility will be home to scientists in ecosystem processes, molecular and microbial biodiversity, climate change adaptation, taxonomy, and biological computing. Innovative research includes the Biodiversity Knock-Out Experiment (BIOKO), a unique and massive project to study the effects of species removal from an ecosystem. The goals are to understand how biodiversity loss affects an ecosystem's ability to respond to disturbances and whether climate change will compound these effects. The experiments will be carried out on grassland sites from arctic tundra to the prairies at various levels in the food chain, from soil bacteria to herbivores.

The centre will also include a new biological facility to house and maintain UBC's invaluable collections of plants, insects and vertebrates on display at various locations across campus. Public education in biodiversity is also part of the centre's mandate. Fundraising is underway for undergraduate and public teaching labs and public exhibition space. "This follows the tradition of amateur naturalists who have contributed much knowledge," says Iain Taylor, botany professor and associate director of the Centre for Biodiversity Research. www.zoology.ubc.ca/biodiversity

$27 Million for Infectious Disease Research

GENOME CANADA CONTRIBUTED $13.5 million, the Saskatchewan Government $5 million, and industry partners AniGenics and Inimex contributed $8.5 million to study the mechanisms of the immune system and how they might be enhanced to treat and prevent human and animal infections. The Functional Pathogenomics of Mucosal *cont'd on p. 7*

Science's Super Achievers

HIGHLY MOTIVATED, BRILLIANT, ENTHUSIASTIC. THE ADJECTIVES APPLY TO many gifted science undergrads, but recent honours graduates Priscilla Brastianos and Timothy Chan are the "crème de la crème." Other educators agree. Brastianos has just completed a combined honours biochemistry/chemistry degree, with top thesis honours for her year. She has been accepted to study medicine at Johns Hopkins University, where she plans to pursue a career in neuroscience. Chan has spent his summers studying mathematics at Harvard, Stanford and Peking University. This fall he will be attending MIT on a Presidential Fellowship as a PhD candidate in operations research.

Photos: Greg Morton, UBC Media Group

Their academic accolades and awards are numerous. Both are Wesbrook Scholars, an award given to the twenty most outstanding UBC undergraduates for academic excellence, leadership and community service. (Brastianos has received the award twice). Both have received NSERC student research awards. Both are recipients of the Charles and Jane Banks Scholarship for UBC academic excellence. The lists go on. Their involvement in extracurricular activities and outreach is equally impressive.

"The activity that had the biggest impact on my life without a doubt was Golden Key," says Chan. The international organization for honours students promotes leadership, mentorship, and humanitarian activities. In 2001-02 Chan was Canadian student representative for 15 chapters and president of the UBC Chapter. He was also science student representative on the UBC Senate serving on budget, library and academic committees, and executive of the Science Undergrad Committee. He is an avid tennis player and scuba diver and has instructed both sports.

Brastianos was a Dean of Science Ambassador, Faculty of Science Advisory Committee member, president of the biochemistry club, and founder, editor and writer of Paradigm, UBC's Science undergrad publication. She also has volunteered at seniors' homes and BC Children's Hospital. "My passion is to make a difference in people's lives," she says. "My experience with these children and seniors has been an inspiration for my pursuit of a career in medicine." Brastianos has also been writing poetry and public speaking since she was in grade six—when she addressed an audience of 2,000 during the visit of the Greek foreign minister. Since then she has spoken at many UBC functions, including UBC's graduation ceremonies this May.

cont'd on p. 7

Sizing up Superconductors

The impenetrable properties of high temperature superconductors have been a major focus of study in materials physics for the past 15 years. Researchers suspected, but couldn't prove, that their electron pairs had asymmetric, D-wave orbitals that produced an uneven wave function or "energy gap," which would account for their unusual properties. UBC physicist Walter Hardy developed an apparatus and technique to accurately measure the magnetic penetration depth, or how far microwaves penetrate into the surface of the superconductor. His work helped to prove the D-wave theory and his background research paper remains one of the most highly cited physics papers in the last decade (number 43 out of 700,000).

Photo: Hot Digital Dog Studios

Hardy literally designed the measurement device "on the fly," enroute to a conference in Paris. His notebook (left, shown with actual component) reads like a diary, only illustrated with formulae and diagrams. "Penetration depth: try to jog the creative juices again…" The device involved many of the same technical issues that went into designing the hydrogen maser. It was also built from scratch and experiments were running within four months of Hardy's rough design. "The success of the project relied on the fact that Ruixing Liang was making very good crystals and Doug Bonn was doing excellent work in surface resistance measurement," says Hardy. "It really was a team effort."

Walter Hardy; *cont'd from p. 1* discovered in 1986, Hardy and his research group found themselves riding the wave, almost by accident. In the spring of '87 they decided to make some samples of the material for the Physics Department's open house. "Right during that time we heard that yttrium-barium-copper-oxide (YBCO) crystals were superconducting at 93K," he says. They managed to find the chemicals to make them and attracted a lot of attention in the process. With initial NSERC funding to build the facility, Hardy and colleagues Ruixing Liang and Doug Bonn (see Synergy 7.1) now have the best crystal-growing lab in the world. "We really started from nothing, but the fact that we had these key people in the same place at the right time really made the difference."

As he reaches the pinnacle of his career, Hardy ponders what he will do on retirement. Possibly work in nanotechnology behind the scenes. Certainly spend more time mastering Chopin. Does he have any regrets at not having pursued a career in music? "Being a professional physicist and an amateur pianist is much easier than the reverse," he says. The note is definitely *giocoso*.

Protozoa—Nature's Gamblers, Pirates, and Parasites

For evolutionary microbiologist Patrick Keeling, the most interesting phenomena happen at the molecular level. His work in protozoan evolution, gene transfer and the origin of intracellular parasites is shaking gene trees and testing traditional evolutionary theories.

MOST OF evolution, and the resulting genetic diversity, happened at the level of a single cell; animals evolved from single-cell flagellates, and plants evolved from green algae. The happenstance nature of these events is one of the most surprising discoveries in recent evolutionary biology. "The foundations for most life forms were set up in protozoa and we hardly know anything about them," says Patrick Keeling, assistant professor in Botany and scholar of the Canadian Institute for Advanced Research (CIAR).

Biologists categorize living organisms as either prokaryotes (bacteria and archaea) or eukaryotes (everything else). "In bacteria, the DNA is not bound by a membrane, whereas in eukaryotes, it is sequestered in one small part of the cell," says Keeling. His study of protozoa, or "eukaryotes that are not animals, plants or fungi," has resulted in more startling discoveries. For example, the intracellular parasites microsporidia were originally thought to be very primitive eukaryotes. Instead, they are highly evolved fungi. "Animals and fungi are closely related, so this is like catapulting microsporidia from the very bottom of the evolutionary ladder to the top." Paradoxically, their genetic composition has been stripped down to the bare essentials. (see sidebar).

Botany Assistant Professor Patrick Keeling is a Michael Smith Foundation Scholar and a member of the Centre for Biodiversity Research at UBC.

In lateral gene transfer, genetic information is transmitted between two unrelated organisms, potentially replacing components of existing biological systems or introducing new functions into a cell. Until recently this process was regarded as extremely rare. However, most molecular data has come from the study of higher eukaryotes (animals, fungi and land plants), and their digestive and reproductive systems inhibit gene transfer. "If you eat a piece of corn, and by some miracle a corn gene made its way into your gut cells, you would never pass it on to your kin," says Keeling. "If a protist eats something and gets pieces of DNA into its genome, it is passed down."

Keeling and his group are studying symbiosis, or the "swallowing" of one organism by another as a source of gene transfer in algae. Both Green and Red Algae have been swallowed by other cells and have formed a permanent partnership with their new "host." By randomly sequencing the expressed genome of one such symbiotic pair, Keeling's group found that it contains genes from four to five different evolutionary sources, including bacteria and other eukaryotes. "They have obviously been eating a lot of organisms and the DNA has been making its way into the nucleus and taking over—and it's all by chance." Keeling's lab also has found that even parts of genes can be transferred and recombined with the original gene. "Now we can say that the unit of a gene is not discrete and this puts things at a whole new level."

Intracellular Parasites

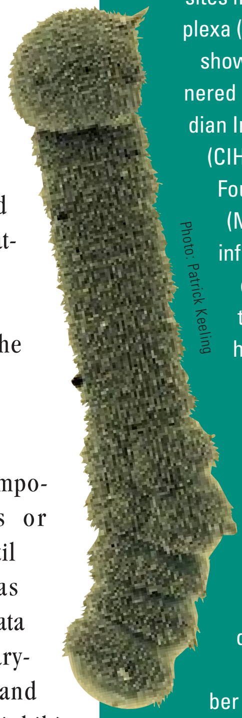


Photo: Patrick Keeling

Evolutionary biologist Patrick Keeling's research on single-cell parasites microsporidia and apicomplexa (haplozoon, a relative, is shown at left) has recently garnered him awards from the Canadian Institute of Health Research (CIHR) and the Michael Smith Foundation for Health Research (MSFHR). Understanding the infection mechanism of these common parasites and how they evolved may have major health implications.

Both types of parasites infect nearly every type of animal—including humans—causing a variety of diseases. The apicomplexan Plasmodium is responsible for malaria, one of the most deadly infectious diseases in humans.

Microsporidia cause a number of commercially devastating disease in fish and silk farming, and have been identified as a pathogen in individuals with immune disorders. Yet these stripped down parasites used to have a "regular life" as free-living organisms. Apicomplexa are related to dinoflagellate algae and microsporidia derived from fungi. What caused these protozoa pirates to "turn bad," and discard genes for a variety of cellular processes and metabolic pathways in the process, is a mystery Keeling is working to solve.

Microsporidia also have a spectacular method of cell invasion; a membranous tube pierces a host cell, turning inside out in a fraction of a second as it spews its contents into the hapless target cell. The parasite emerges from the end of the tube having lost its membrane and gained a new one. "I think this is the only incidence in biology where this happens," says Keeling. "It's rather cerebral because a cell without a membrane just isn't a cell."

Eruptions from the Earth's Core

Isotopic geochemist Dominique Weis studies the origins and eruptions of magma from deep inside the earth. Understanding how this activity forms and shapes continents and alters our environment will provide crucial information on the history of global change.

DEEP BENEATH BUSTLING FREEWAYS AND SERENE LANDSCAPES the earth is grinding, shifting and fuming—breaking apart continents, forming mountain ranges and oceanic islands, and dramatically altering Earth's atmosphere. Dominique Weis came to UBC from the University of Brussels, where she was director of research of the Fonds National de la Recherche Scientifique, the Belgian equivalent of NSERC. A new faculty member in Earth and Ocean Sciences, Weis works at the forefront of recently discovered geochemical phenomena.

Oceanic plateaux and islands, like the Kerguelen Plateau (inset photo, below) in the southern Indian Ocean, the Galapagos Archipelago and the Hawaiian Islands, were formed by enormous eruptions of basaltic lava. These eruptions originate deep within Earth's interior, at the boundary of the core and mantle—a depth of 2700 km. Ascending columns of hot rock push up towards the surface, melting as they release pressure. These pressurized columns of hot magma are called mantle plumes.

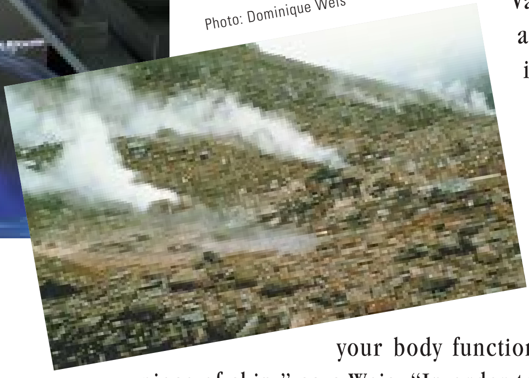
Only about five to ten percent of the lava breaks through the earth's crust. The remaining head of the plume forms a huge bulb-like plateau, called a Large Igneous Province (LIP) under the ocean floor, or spreads out on the earth's surface to form part of continents. About 100 million years ago, the biggest outflow from the Kerguelen plume produced a total volume of lava estimated at about 2 million cubic kilometres. "The surface area is huge, roughly one-third the size of the United States."

Dominique Weis, Associate Professor in Earth and Ocean Sciences, studies the chemical evolution and structure of the earth's mantle and crust.

Using geochemical and isotopic analysis of the lavas from various mantle plumes, Weis is working to determine their composition and the rates at which major geological processes occur. Since the deepest drill core in the earth's crust is only 12.7 km, the discovery of mantle plumes and the ability to analyse the exotic samples they spew forth have revolutionized the study of Earth's interior. "The isotopic composition is like a fingerprint of the lava," says Weis. "Oceanic islands such as Hawaii and Iceland have very specific isotopic composition. This tells us that the mantle is chemically heterogeneous."

In British Columbia, Weis will be studying what appears to be an LIP called Wrangelia that forms Vancouver Island and continues up into Alaska, as well as the Cache Creek terrain, part of an LIP in the interior of BC. "Imagine trying to understand how your body functions by studying a piece of skin," says Weis. "In order to understand the earth's processes we need to know what is happening at the core."

Photo: Dominique Weis



When not in the lab or collecting geological samples from remote corners of the globe, Weis enjoys photography. Her office is adorned with haunting images of the landscapes and people she has encountered—and captured with the eye of someone who sees beneath the surface.

Isotopic Investigation

After a PhD in isotopic geochemistry at the University of Brussels, and a post-doc in Paris, Dominique Weis was invited to the California Institute of Technology in Pasadena to undertake her second post-doc and learn the finer arts of mass spectrometry. Now co-director along with Jim Mortensen of the Pacific Centre for Geochemical and Isotopic Research (PCIGR), Weis was recently responsible for acquiring and installing the centre's state-of-the-art Nu Plasma multicollector inductively coupled plasma mass spectrometer (MC-ICP-MS).

The high temperature of the plasma (8000 K) in MC-ICP-MS allows researchers to analyse many more elements than by the traditional thermo-ionization technique. It also has important applications in medical science (studying metabolism rates and timing the retention of certain elements within the body) and biological sciences (determining the role of organisms in the genesis of specific geological formations).

Weis is interested in applying isotopic studies to environmental and multi-disciplinary problems. Geochemical detective work using isotopic "fingerprinting" as a way to trace industrial pollution will also be a focus of Weis's work at PCIGR (see Synergy 6.1). "One of a geochemist's most critical tasks is to understand the background stages of the earth, and the state of equilibrium between the mantle, the surface and the atmosphere, in order to accurately assess the effect of human activity, pollution and global change."

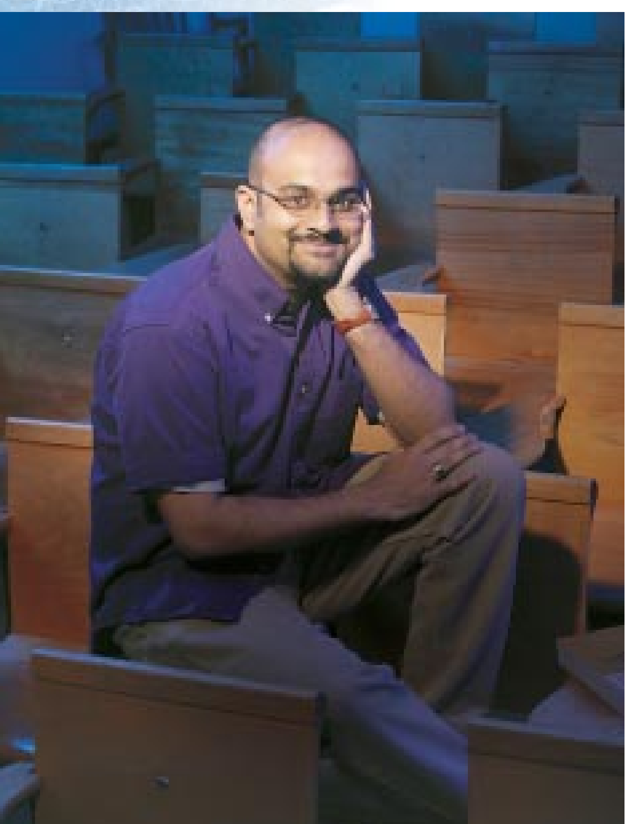
Patterns, Primes, and Predictions

Much of what we perceive as beautiful—a lovely face, a perfect rose—has an inherent mathematical symmetry. Mathematician Vinayak Vatsal finds beauty in numbers themselves. His work investigates their seemingly simple yet ineffable properties, patterns, and predictive power.

THE CEREBRAL LANGUAGE OF MATHEMATICS IS AN increasingly important one to understand. It is the foundation of all science and technology-related disciplines and industries. While many people study math in order to enter another field, Assistant Professor Vinayak Vatsal admits his "prime" love is number theory, one of the oldest and largest branches of pure mathematics. Like most loves, it had competition.

As a graduate student and lecturer at Princeton, Vatsal was also interested in literature. He took several courses in creative writing with well-known authors such as Joyce Carol Oates. He even published several stories. "I actually made money off of them," he says. "I was thinking about quitting math to write and Joyce was extremely encouraging." In the end, numbers won over words.

Budding mathematicians are an incisive—even poetic—lot. They get hooked on the inherent beauty and truth of a theorem, and the pivotal moment where something is proved and understood. Vatsal's first "eureka moment" was in eighth grade. "I was trying to trisect an angle—a famous and unsolvable problem that goes back to the Greeks—using bisection." His math teacher explained why this approach could never work because halves can never be broken up into thirds. The Fundamental Theorem of Arithmetic states that there is only one way to factor a number into the product of its primes (for example 9 = 3 x 3)."This was an impressive moment because for the first time I realized that unique factorization actually exists," he says.



Assistant Professor Vinayak Vatsal was recently one of twenty mathematicians in North America to receive an Alfred P. Sloan Research Fellowship.

Prime factorization has applications in cryptography and is the subject of an undergrad course that Vatsal teaches. "A code is a procedure that allows you to compose a message so that writing is very easy and reading is extremely difficult," says Vatsal. One method is to generate large prime numbers and multiply them together. Getting a very large product is easy—factoring it into its components is daunting if not impossible. This is the basis for security systems used by banks and for internet authentication.

Many problems in number theory are easy to state and impossible to solve. One of the most famous was Fermat's Theorem: Are there three numbers, x, y, and z that fit into the equation $x^n + y^n = z^n$? The answer is simple when n=2 (Pythagoras' theorem). For hundreds of years esteemed mathematicians and amateurs alike tried to find a solution when n was greater than 2. There simply aren't any, and this was finally proved in 1995 by Andrew Wiles, who also happened to be Vatsal's thesis advisor. "The problem is simple but the solution uses pretty much every branch of mathematics you can think of," Vatsal says, holding up the 150-page proof. Not a best-selling novel perhaps, but to Vatsal, equally engrossing.

L-functions and Modular Forms

For the non-mathematician the words calculus and algebra are often uttered in the same shuddered breath. For UBC mathematician Vinayak Vatsal, they are the proverbial apple and orange. "In algebra you are dealing with things that are quite rigid, such as rational numbers and fractions; they come in discrete packets," he says. "Whereas calculus deals with infinitesimals, approximations and continuous things."

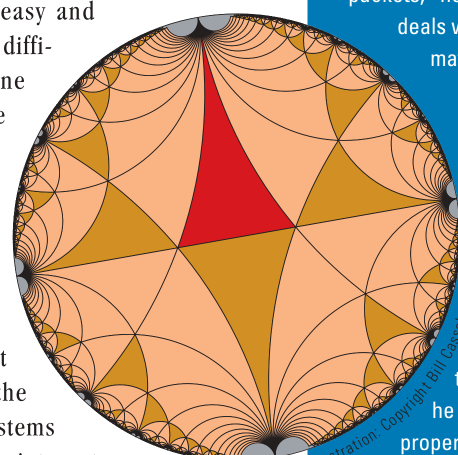


Illustration: Copyright Bill Casselman

Vatsal's area of specialty is L-functions, a type of continuous function found in calculus that is used to encode algebraic information. "What we essentially do is use the solution to an algebraic equation to produce a function in the world of calculus," he says, "and somehow, the properties of this function tell you everything you could possibly want to know about the algebraic thing you started with."

Vatsal uses L-functions to study elliptic curve equations. And he uses modular forms (classical constructions going back to the 18th century) to produce L-functions with particularly nice properties. "Going back to the proof of Fermat's theorem, it turns out that L-functions from elliptic curve equations are the same as the L-functions from modular forms, even though they seem to be in completely different universes." Intrigue, fascination, plot twists—Vatsal's research sounds like it just might have the makings of a good suspense novel.

UBC's Science Brain Gain

The Faculty of Science welcomes these new faculty members with a glimpse into their research and their passions outside of the lab.

BRETT GLADMAN, Physics and Astronomy. Research: Formation of the Solar System; comets, asteroids, and satellites. "I hope to one day understand how the planets and other small bodies of our Solar System were formed, and maybe visit most of them."

MICHIEL VAN DE PANNE, Computer Science. Research: Computer animation and computational motion. "How can we shrink the gap between our ability to appreciate graceful, purposeful movements, and our ability to create such motions using computer graphics and robotics ? When not observing and computing motions, I like to practise movements of my own, usually on skates or skis."

Brett Gladman, Michiel van de Panne, Steven Samuel Plotkin, Jane Roskams, George Sawatzky, James Scoates, Philippe Tortell

Photos: Greg Morton, UBC Media Group

STEVEN SAMUEL PLOTKIN, Physics. Research: Theoretical Biomolecular Physics. "I spend most of my time in search of simple and general laws which may underlie even the most complex phenomena."

JANE ROSKAMS, Developmental Neurobiology. Research: "Following my nose to understand nervous system development. By day, we study how neural stem cells and glia from the olfactory system interact to build the circuits that help me to learn at the end of the day how to keep up with my kids, bike, run, rollerblade, cook, sing and dance."

GEORGE SAWATZKY, Physics and Astronomy / Chemistry. Research: Condensed matter physics and materials science. "To realize our dreams of quantum computers and nanometer scale devices we need to understand the complex and unpredictable relationship between chemical composition, atomic structure, electronic structure, and the physical properties of solids. My work involves manipulating matter on an atomic scale in order to construct structures not attainable via known chemical synthesis pathways."

JAMES SCOATES, Geological Sciences. Research: Understanding the origin and evolution of silicate magmas in the Earth's crust and mantle and constraining the formation of magmatic ore deposits. "When not in the lab or teaching, I look forward to taking advantage of the spectacular hiking opportunities in the mountains around Vancouver."

PHILIPPE TORTELL, Earth & Ocean Sciences / Botany. Research: Environmental regulation of greenhouse gas metabolism by marine microbes. "I am interested in understanding how marine micro-organisms will respond to and potentially mitigate human impacts on global climate."

Infectious Disease Research; *cont'd from p. 2* Immunity (FPMI) project is co-led by Robert Hancock, Canada Research Chair and director of the Centre for Microbial Diseases and Host Defence Research at UBC, and Lorne Babiuk, head of the Veterinary Infectious Diseases Organization at the University of Saskatchewan. The project also includes bioinformatics specialist Fiona Brinkman from SFU and several other researchers from UBC and the BC Cancer Agency.

"We are using comparative genomics to study the similarities between the immune systems in animals and humans," says Hancock. "We want to find out how every gene in the body responds to different pathogens." The first step on the road to infection is through the mucosa, or surfaces of the mouth, respiratory and GI tracts. The project will include studies of the effects of a broad range of pathogens (bacteria, viruses, fungi, and parasites) on humans, chicken and cattle.

Hancock and UBC colleague Brett Finlay, also FPMI co-applicant and co-founder of Inimex, have been working to develop compounds that enhance the body's innate defence mechanisms, so that it can defend against more—or more exotic—pathogens. "This is an important area because of the huge issue of resistance to all of the chemicals we use to kill pathogens," says Hancock. "We are really bridging two areas: animal health and agricultural health, which is quite unique."

Super Achievers; *cont'd from p. 3* Both Chan and Brastianos also play piano. "Approaching a problem in science is like dancing with the keys of the piano, or weaving words in poetry," says Brastianos. "Science does not progress without creativity."

Physics and Astronomy honours and prizes

George Sawatzky of Physics and Astronomy was knighted by the Queen of the Netherlands. The term "ritter" is equivalent to the title "sir" in England, although the Dutch do not use titles. Harvey Richer's work with the Hubble telescope on new methods of determining the age of universe was the subject of major NASA release. Matt Choptuik, an expert in numerical relativity, was one of 20 top researchers in Canada aged 40 and under to receive the Canadian Institute for Advanced Research Young Explorers Prize. Jaymie Matthews won the Canadian Association of Physicists (CAP) Prize for teaching excellence. Fional Burnell came first in the national CAP prize exam and Max Metlitski placed 6th.

Did you know…

Physics and Astronomy students were awarded 17 NSERC postgraduate scholarships, the largest number of any department at UBC.

Botanists thrive and bloom

George Haughn and Ljerka Kunst received UBC Izaak Walton Killam Memorial Faculty Research Fellowships. Haughn also received a Japanese Society for the Promotion of Science Fellowship. Neil Towers (professor emeritus) was awarded the Pergamon Phytochemistry Career Prize. Carl Douglas (Botany), Joerg Bohlmann (Botany/Biotech/Forestry) are project leaders and collaborators in a $2.7-million Genome BC project in Forest Genomics.

Canadian Foundation for Innovation Funding

The Biosciences Imaging Facility was upgraded with $5.2 million in funding from CFI. Doug Bryman in Physics received $3.9 million from CFI for the Laboratory of Advanced Detector Development.

Zoologists Tattersall, Krebs, and Jones receive awards

Glenn Tattersall was recently named the inaugural winner of the Howard Alper Award for his research on metabolic responses to stress. The $20,000 NSERC prize is awarded to Canada's top post-doctoral fellow. Charles Krebs received the Eminent Ecologist Award from the American Ecological Society. David Jones was selected a Peter Wall Institute for Advanced Studies Distinguished Scholar in Residence for 2002.

Dolphin and Sinclair elected to Royal Society of London, new RSC fellows

Chemist David Dolphin, a pioneer in the field of photodynamic therapy, and Zoologist Anthony Sinclair, a world authority on the ecology of large mammals, were the only two Canadians to be elected to the Royal Society of London this year. Tom Pedersen (Earth and Ocean Sciences), George Sawatzky (Physics and Astronomy) and John Scheffer and Steve Withers were elected to the Royal Society of Canada.

Killam prizes and awards

Peter Hochachka (Zoology) was named UBC Killam Professor. UBC Killam Research Prizes were awarded to Michael Gerry (Chemistry), William Mohn (Microbiology & Immunology), Ariel Zhitnitsky (Physics and Astronomy). Beverly Green (Botany) received a Killiam Research Fellowship. Mary Berbee (Botany), Hugh Brock (Zoology) and Lee Groat (Earth and Ocean Sciences) were awarded Killiam Teaching Awards.

Keshet and Behrend win awards, science students elected to Board of Governors

Leah Keshet won the Canadian Mathematical Society's 2003 Krieger-Nelson Prize for outstanding research by a female mathematician. Kai Behrend, a world expert in algebraic geometry, received the 2001 PIMS Research Prize for research, education and industrial outreach. Behrend also received the 2001 Coxeter-James Prize of the Canadian Mathematical Society. Two math students, Mark Fraser and Erfan Kazemi were elected members of UBC's Board of Governors for 2002-03.

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